CTEH® CENTER FOR TOXICOLOGY AND ENVIRONMENTAL HEALTH, LLC

Arkema Facility - Harvey Response

Crosby, TX

Arkema Inc.

September 5, 2017

Project #109489 Summary

9865956

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www.cteh.com

Toxicology Emergency Response 24-Hour Help Desk 1.866.869.2834

Sound Scientific Solutions

1.0 Introduction

As a result of flooding events related to Hurricane Harvey, the Arkema facility located in Crosby, TX suffered a loss of power and failure on refrigeration of manufacturing process. The loss of temperature control resulted in degradation and heating of organic peroxides, with the potential of creating a fire. As a precautionary measure, local authorities established a 1.5-mile radius evacuation zone around the facility.

On August 31, 2017, the Center for Toxicology and Environmental Health, LLC (CTEH®) was contacted by Arkema Inc. (Arkema) to initiate air monitoring and sampling around the community areas outside of the evacuation zone perimeter. This submittal summarizes the results of real-time air monitoring conducted by CTEH® personnel from 06:00 on September 3, 2017 to 06:00 on September 4, 2017. A map of the site location is provided in **Attachment A**.

2.0 Real-time Air Monitoring

All real-time air monitoring instrumentation was calibrated per the manufacturer's recommendations prior to air monitoring. Handheld, real-time air monitoring was conducted for benzene, carbon monoxide, oxygen (O_2), sulfur dioxide (SO_2), and volatile organic compounds (VOCs) using RAE Systems UltraRAE and MultiRAE instruments. Additionally, particulate matter ($PM_{2.5}$) was assessed using DustTraks, and AM510s. **Table 1** summarizes the data for all real-time air monitoring readings recorded in the Crosby, TX Community from 06:00 on September 3, 2017 through 06:00 on September 4, 2017 and Table 2 summarizes the Worker Activity real-time air monitoring readings from within the site boundary for the same period. Maps of real-time air monitoring locations are provided as **Attachment B**.

Table 1 Community Real-time Handheld Air Monitoring Readings
06:00 September 4, 2017 – 06:00 September 5, 2017

Analyte	Instrument	Number of Readings	Number of Detections	Range of Detections*
Benzene	UltraRAE	1	0	< 0.025 ppm
CO	MultiRAE	5	0	< 1.0 ppm
$PM_{2.5}$	AM510	151	151	0.012 - 0.408 mg/m^3
	Dusttrak	26	26	0.023 - 0.047 mg/m^3
SO_2	MultiRAE	7	0	< 0.1 ppm
VOCs	MultiRAE	173	0	< 0.1 ppm

*If detections were not observed, the instrument detection limit is listed in this column.

Table 2 Worker Activity Real-time Handheld Air Monitoring Readings
06:00 September 4, 2017 – 06:00 September 5, 2017

Analyte	Instrument	Number of Readings	Number of Detections	Range of Detections*
O_2	MultiRAE	1	1	20.9 %
VOCs	MultiRAE	13	4	0.7 - 2.4 ppm

*If detections were not observed, the instrument detection limit is listed in this column.

3.0 Analytical Air Sampling

To supplement real-time air monitoring, CTEH® deployed areas along the perimeter of the evacuated area within the community. Evacuated canister (Minican™) samplers were regulated to collect air evenly over a 24-hr period. Analytical air samples will be submitted to SGS Galson Laboratories, an AIHA-accredited laboratory, for analysis using EPA Method TO-15. A map highlighting the analytical air sampling locations is provided as **Attachment C**. Analytical Air Sampling Results will be reported upon receipt from the laboratory.

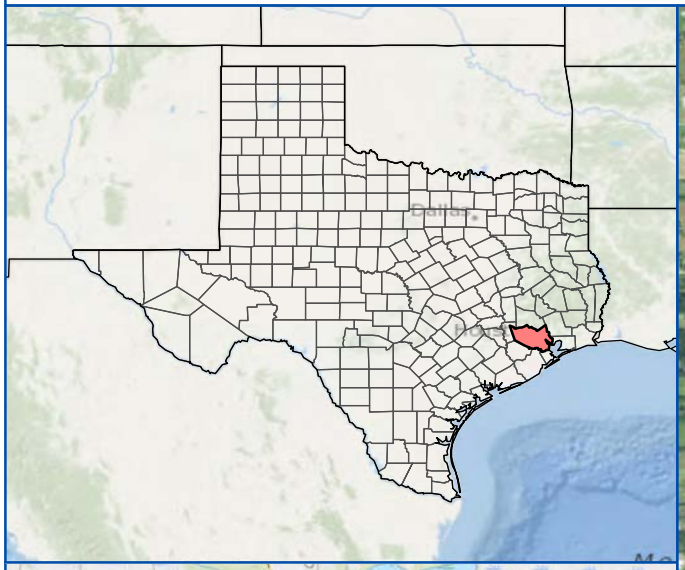
Attachment A

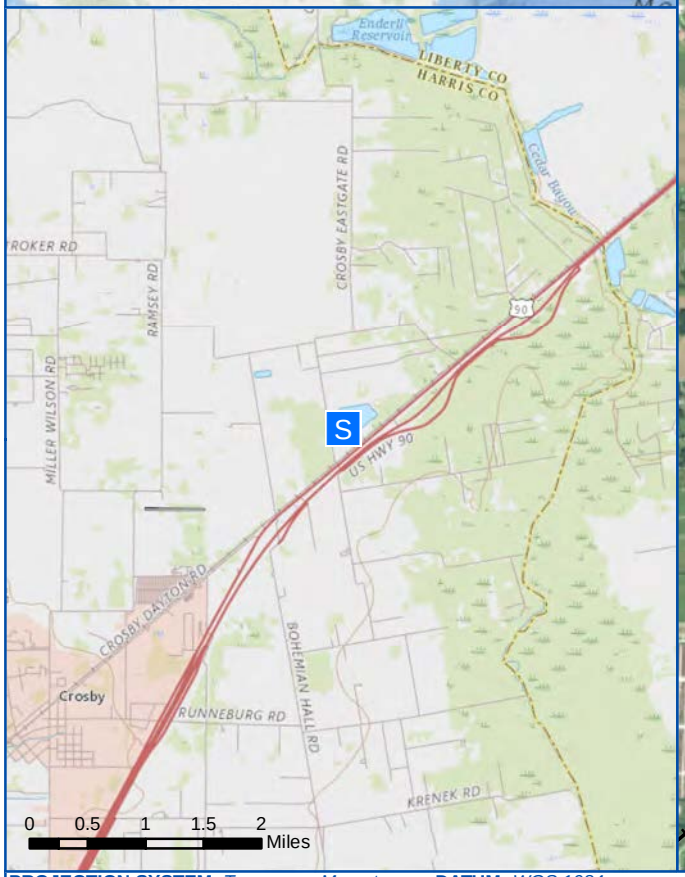
Site Location Map

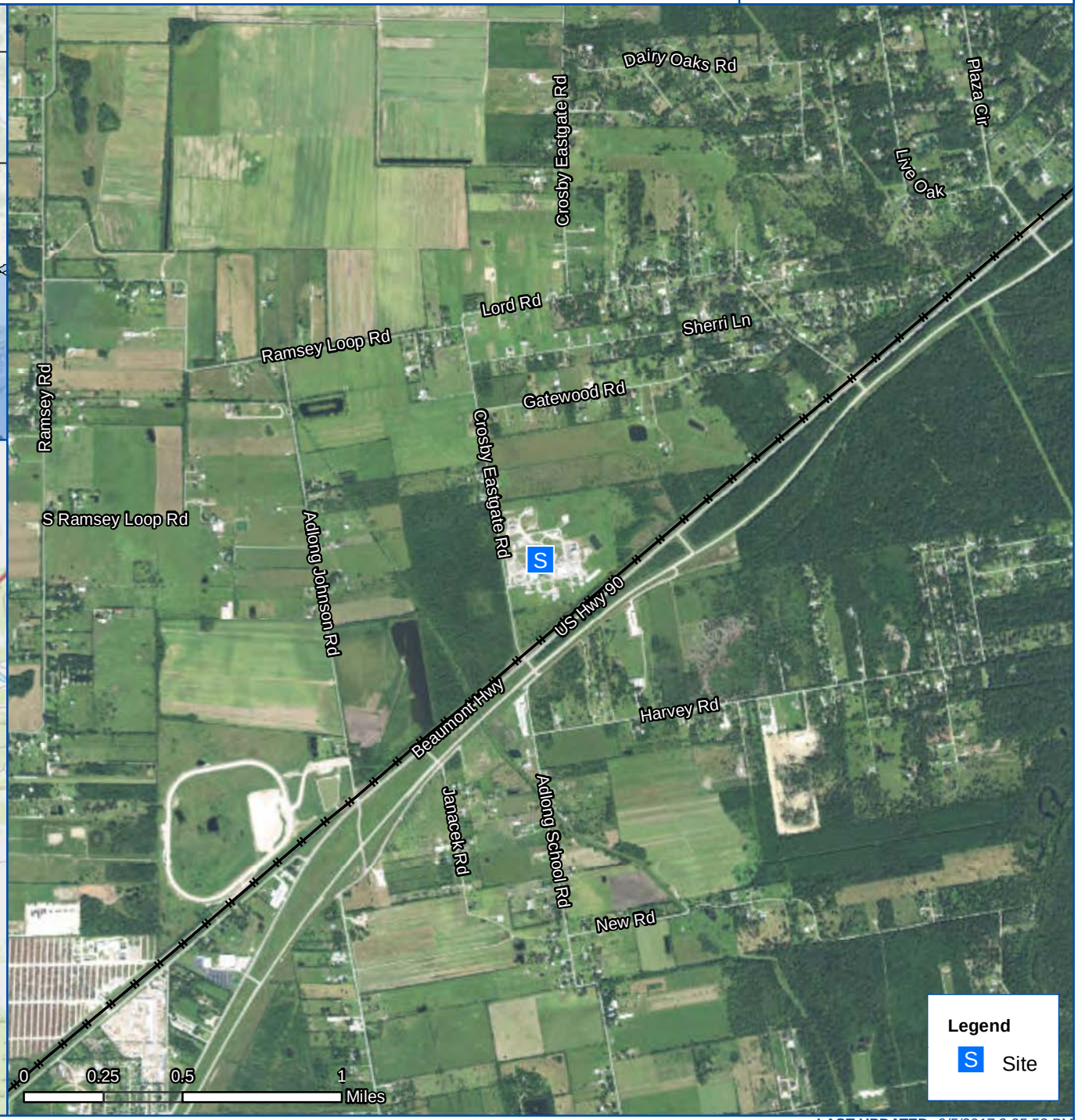
Harvey Response

Site Location

Project: 109458
Client: Arkema
City: Crosby, TX
County: Harris







PROJECTION SYSTEM: *Transverse Mercator* **DATUM:** *WGS 1984* **LAST UPDATED:** *9/5/2017 2:25:53 PM*

Attachment B

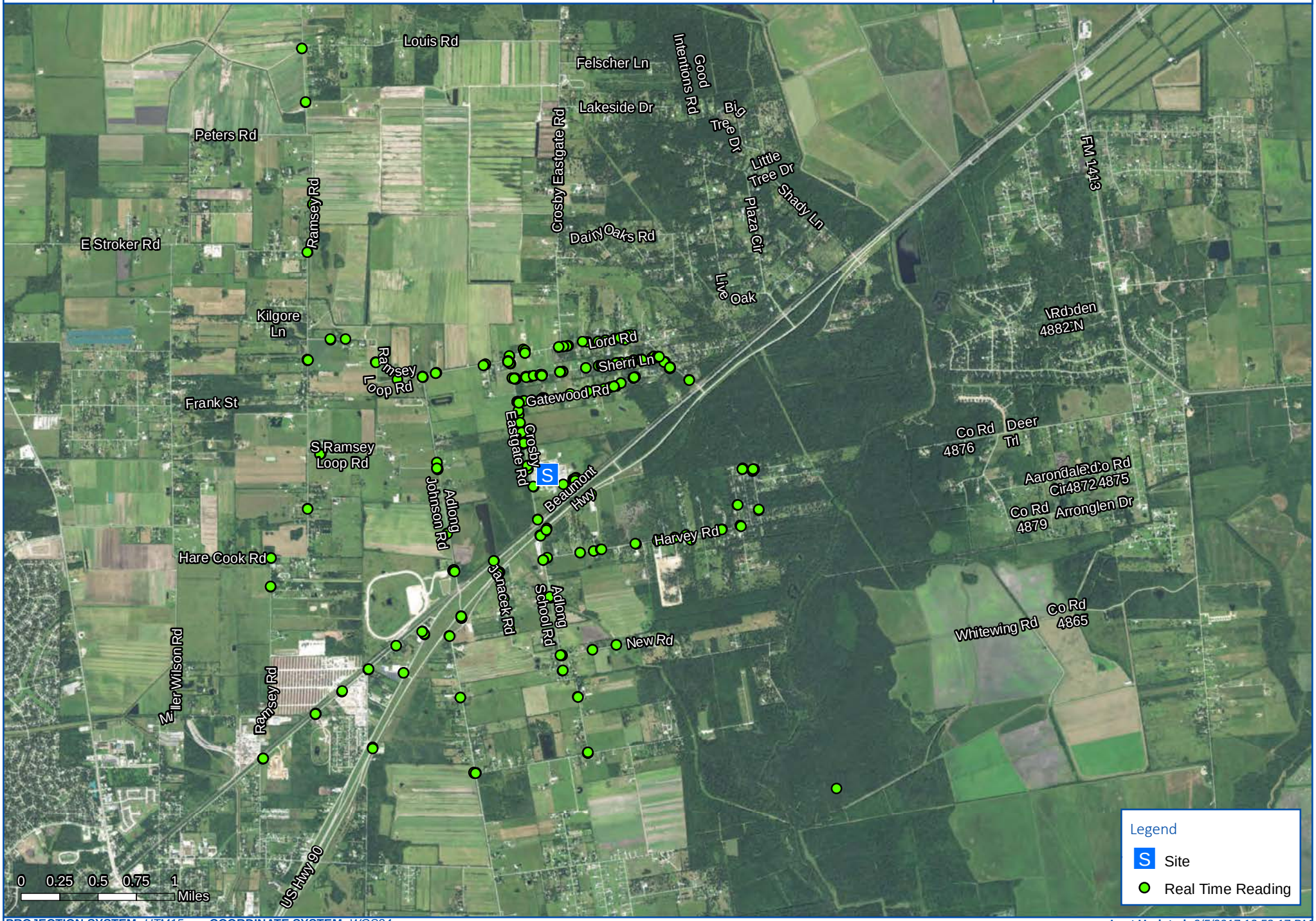
Handheld Real-time Air Monitoring Locations

CTEH

Hand-held Real-time Reading Locations

Harvey Response - 06:00 September 4, 2017 to 06:00 September 5, 2017

Project: 109489
Client: Arkema
City: Crosby, TX
County: Harris



PROJECTION SYSTEM: *UTM15* COORDINATE SYSTEM: *WGS84*

Last Updated: *9/5/2017 12:53:17 PM*

Benzene Hand-held Real-time Reading Locations

Harvey Response - 06:00 September 4, 2017 to 06:00 September 5, 2017

Project: 109489
Client: Arkema
City: Crosby, TX
County: Harris

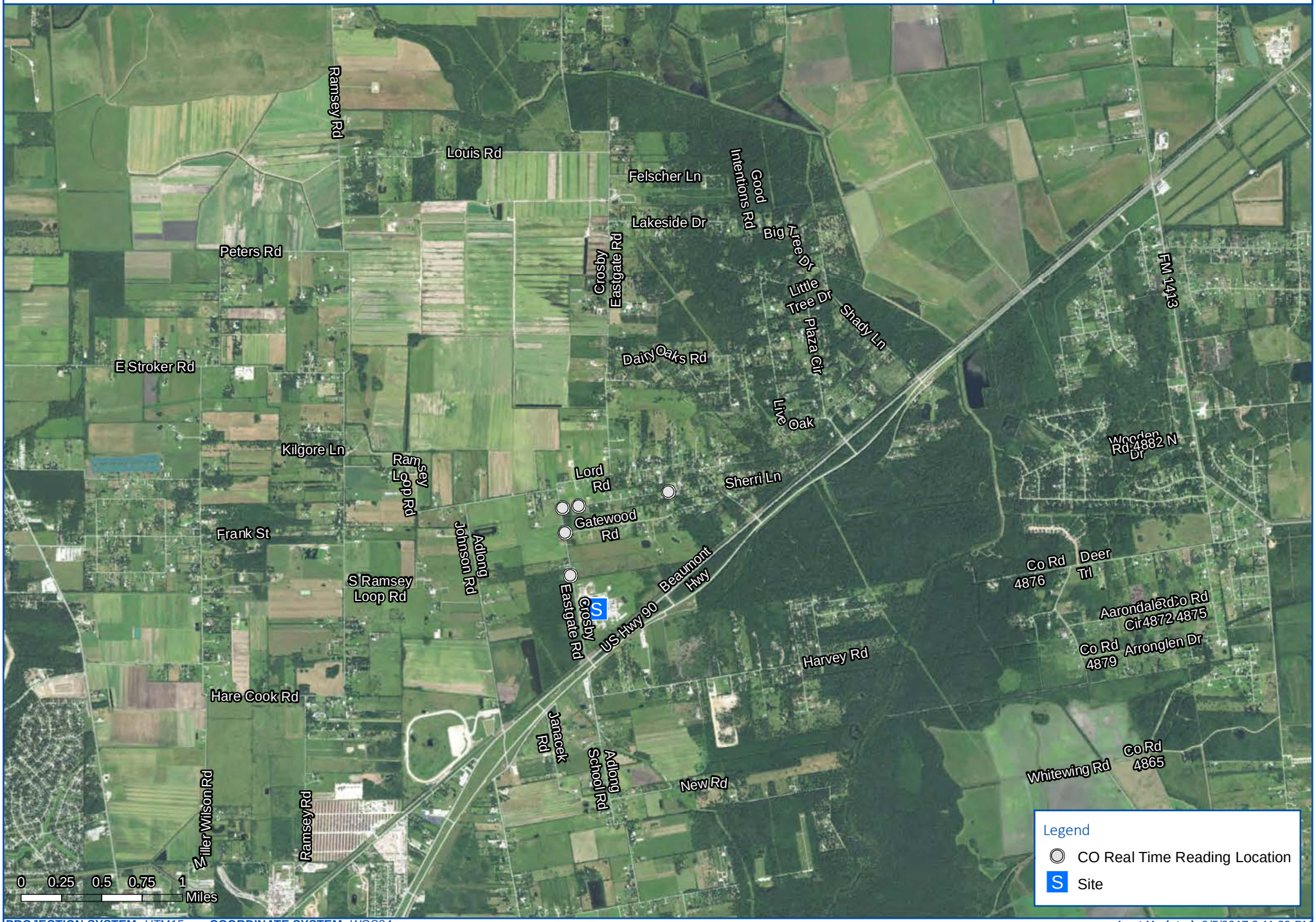
PROJECTION SYSTEM: *UTM15* **COORDINATE SYSTEM:** *WGS84*

Last Updated: *9/5/2017 2:22:56 PM*

Carbon Monoxide Hand-held Real-time Reading Locations

Harvey Response - 06:00 September 4, 2017 to 06:00 September 5, 2017

Project: 109489
Client: Arkema
City: Crosby, TX
County: Harris



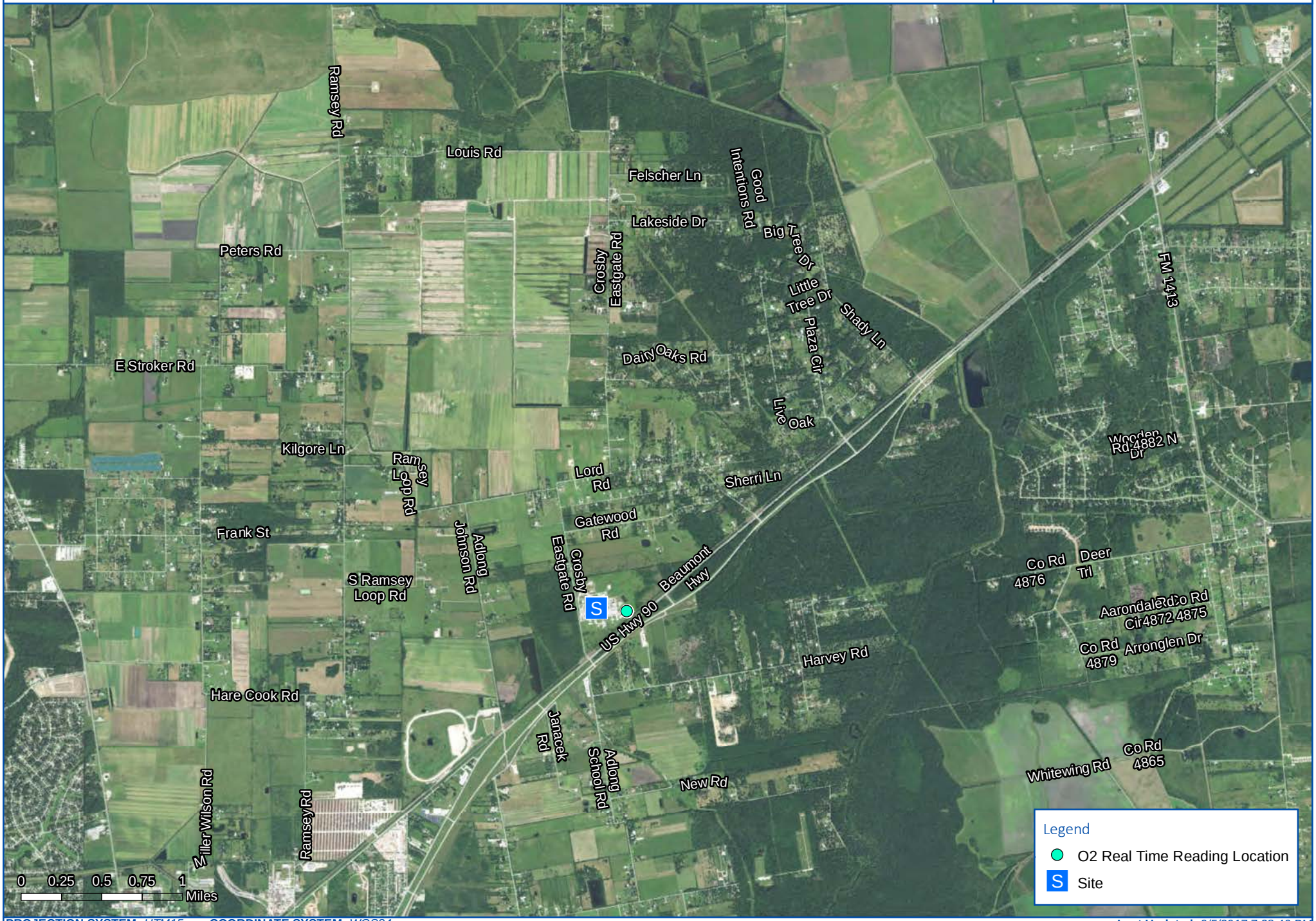
PROJECTION SYSTEM: *UTM15* COORDINATE SYSTEM: *WGS84*

Last Updated: *9/5/2017 2:11:39 PM*

Oxygen Hand-held Real-time Reading Locations

Harvey Response - 06:00 September 4, 2017 to 06:00 September 5, 2017

Project: 109489
Client: Arkema
City: Crosby, TX
County: Harris



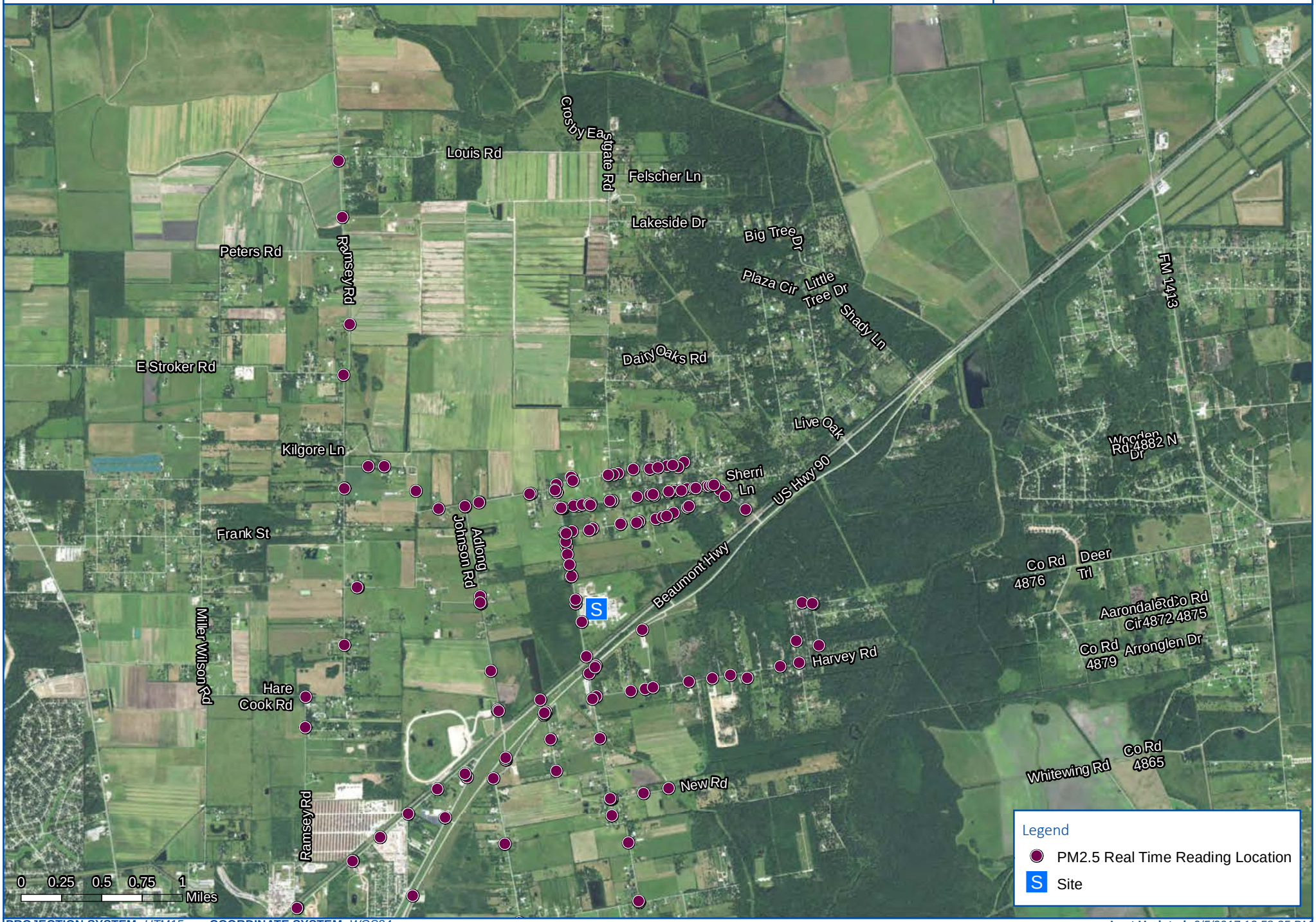
PROJECTION SYSTEM: *UTM15* **COORDINATE SYSTEM:** *WGS84*

Last Updated: *9/5/2017 7:28:40 PM*

PM2.5 Hand-held Real-time Reading Locations

Harvey Response - 06:00 September 4, 2017 to 06:00 September 5, 2017

Project: 109489
Client: Arkema
City: Crosby, TX
County: Harris



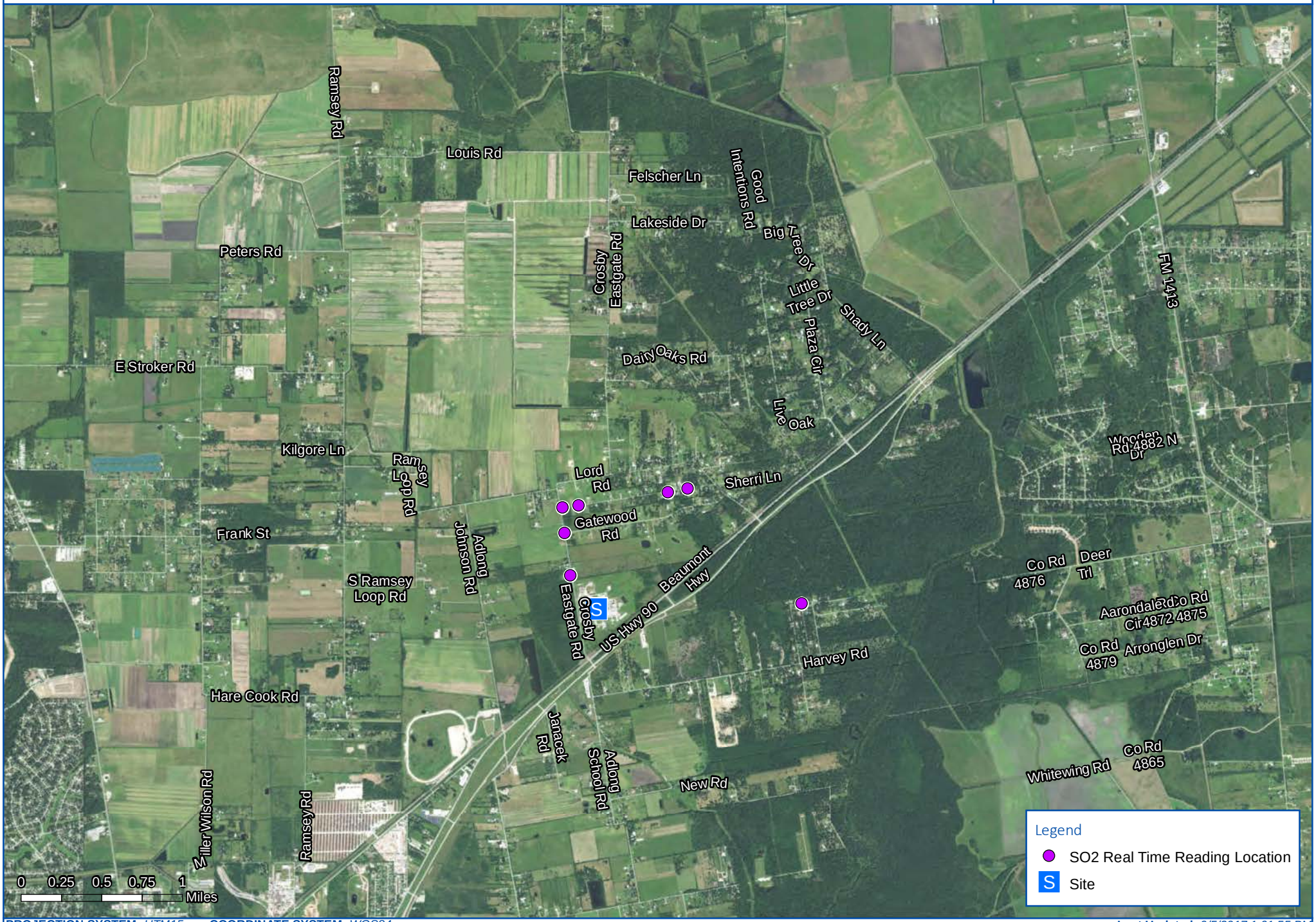
PROJECTION SYSTEM: *UTM15* **COORDINATE SYSTEM:** *WGS84*

Last Updated: *9/5/2017 12:58:35 PM*

Sulfur Dioxide Hand-held Real-time Reading Locations

Harvey Response - 06:00 September 4, 2017 to 06:00 September 5, 2017

Project: 109489
Client: Arkema
City: Crosby, TX
County: Harris



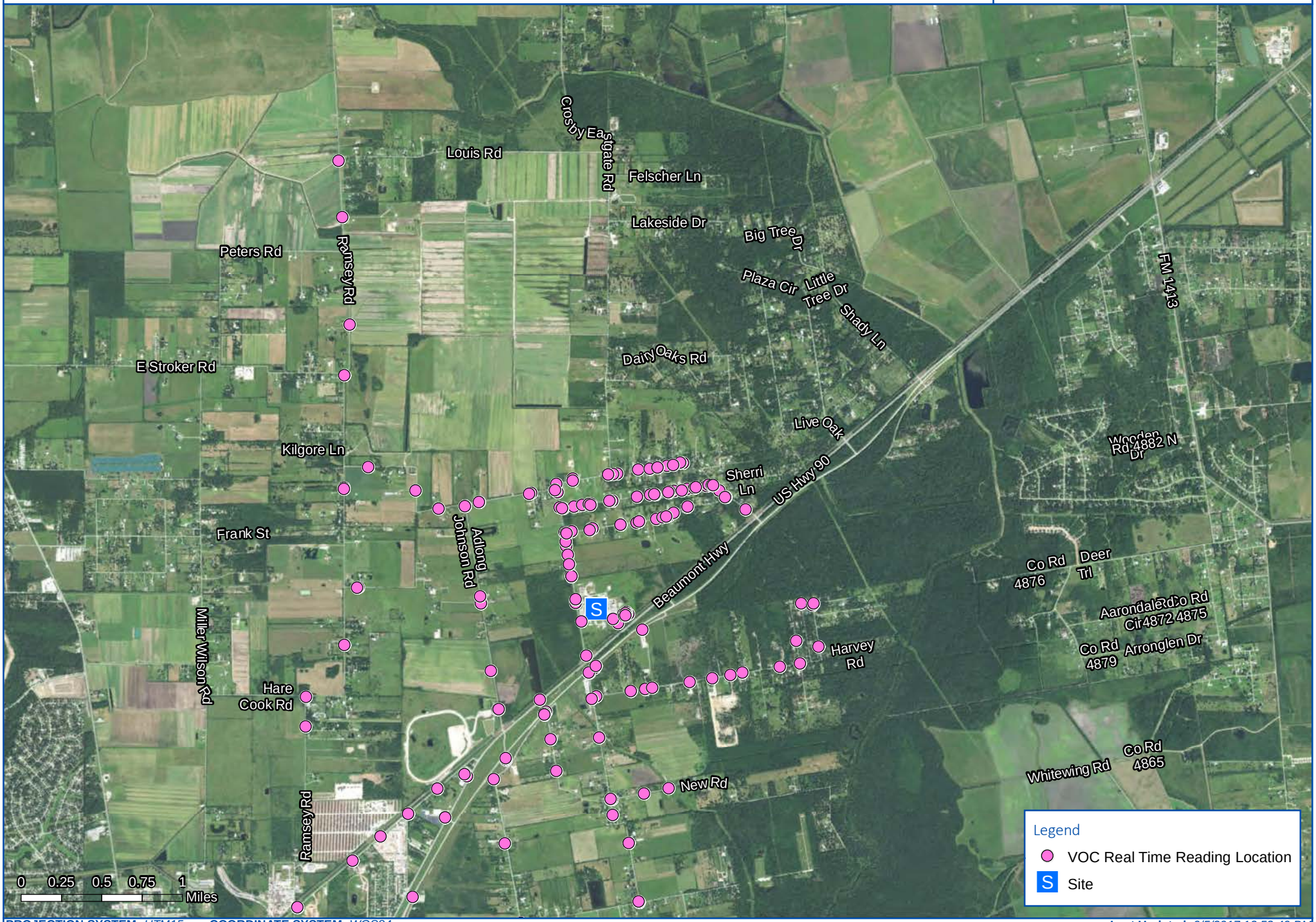
PROJECTION SYSTEM: *UTM15* **COORDINATE SYSTEM:** *WGS84*

Last Updated: *9/5/2017 1:01:55 PM*

VOC Hand-held Real-time Reading Locations

Harvey Response - 06:00 September 4, 2017 to 06:00 September 5, 2017

Project: 109489
Client: Arkema
City: Crosby, TX
County: Harris



PROJECTION SYSTEM: *UTM15* **COORDINATE SYSTEM:** *WGS84*

Last Updated: *9/5/2017 12:53:49 PM*

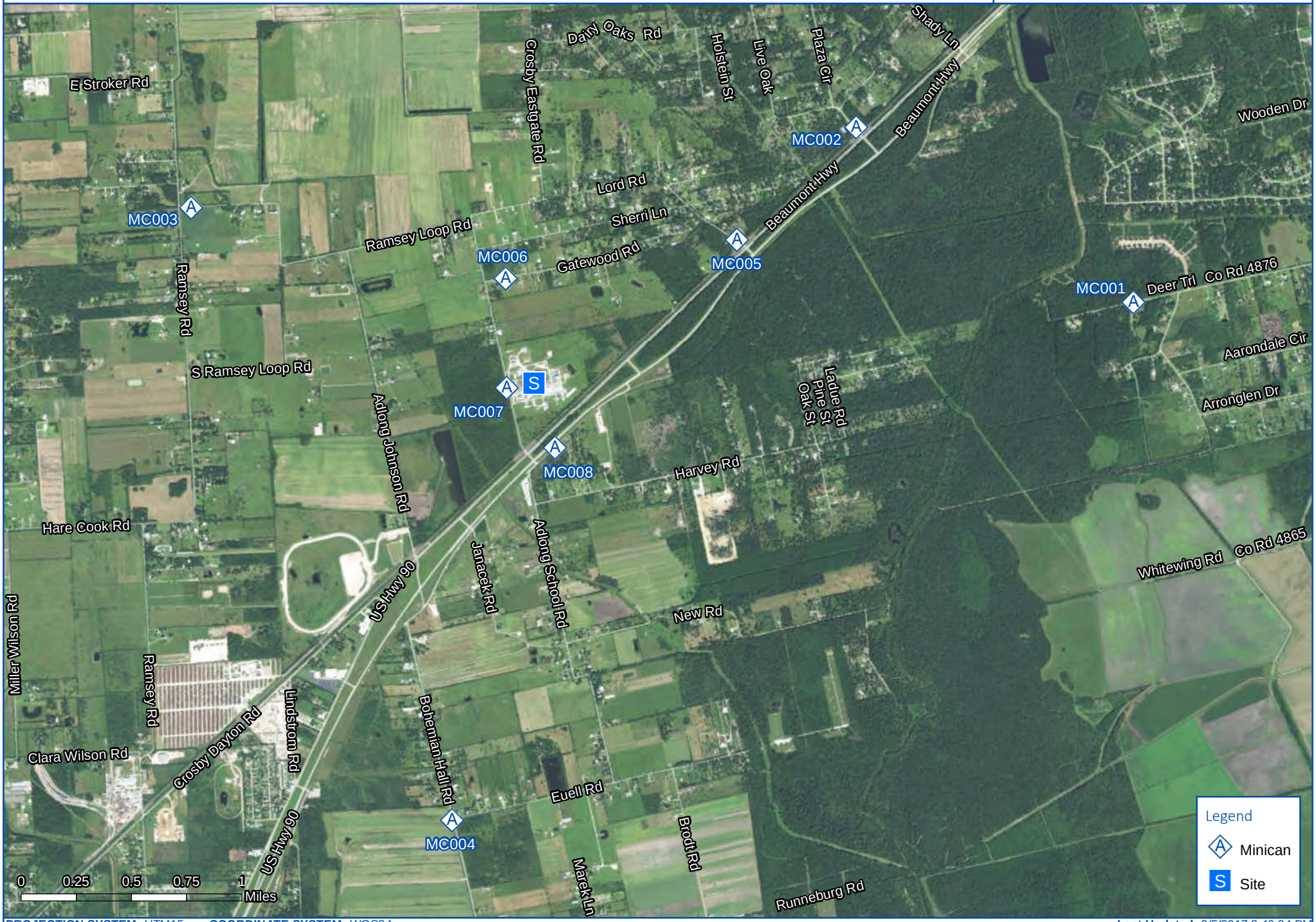
Attachment C

Map of Analytical Air Sampling Locations

Analytical Air Monitoring Station Locations as of September 5, 2017

Harvey Response

Project: 109458
Client: Arkema
City: Crosby, TX
County: Harris



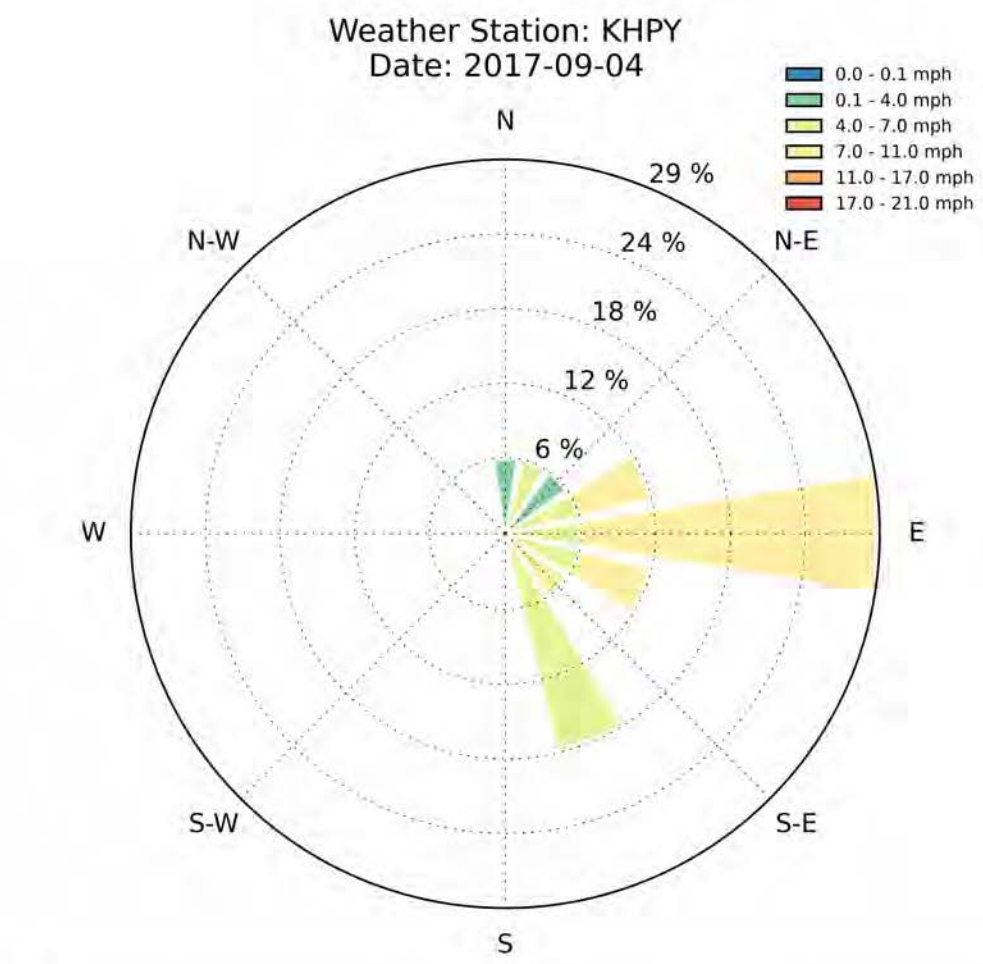
PROJECTION SYSTEM: *UTM15* COORDINATE SYSTEM: *WGS84*

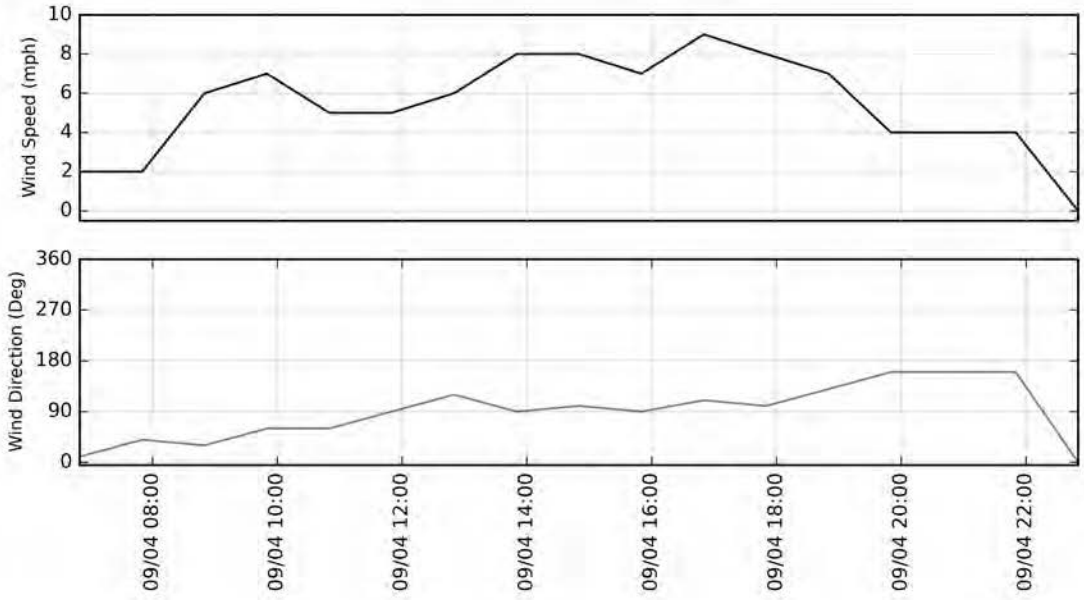
Last Updated: *9/5/2017 8:49:04 PM*

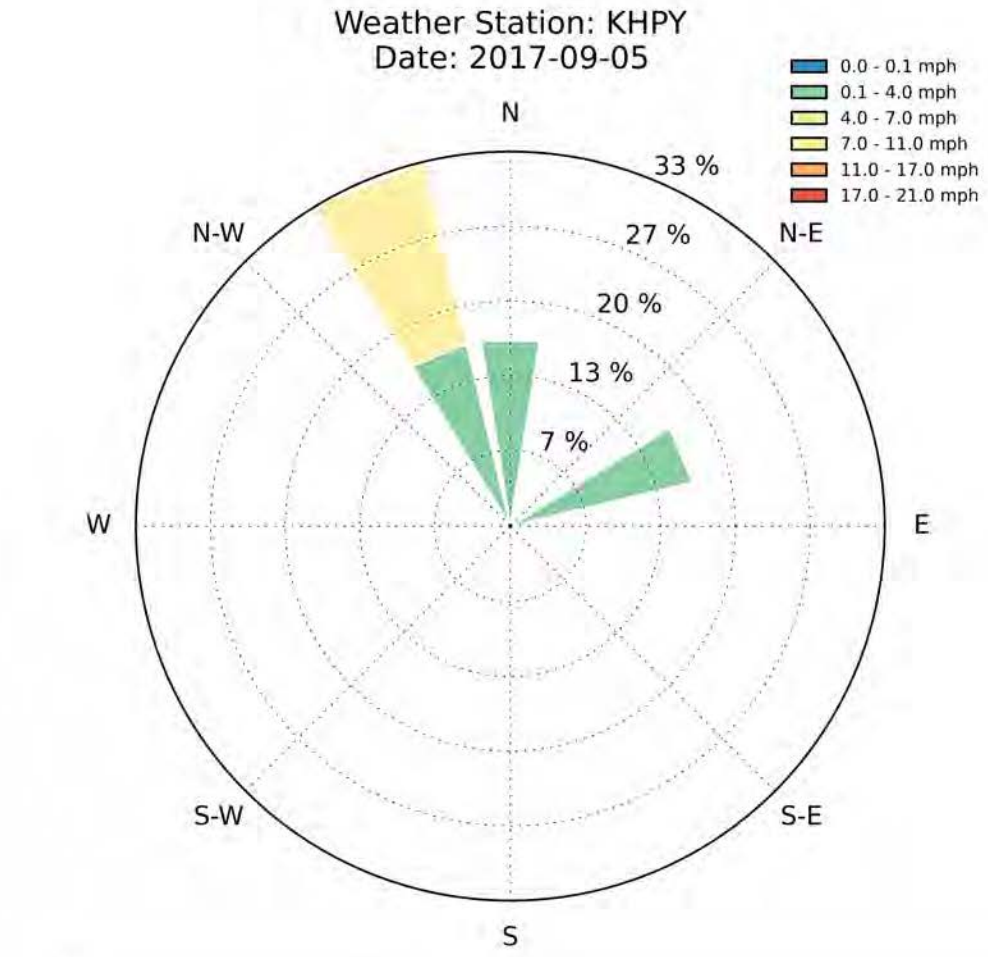
Attachment D

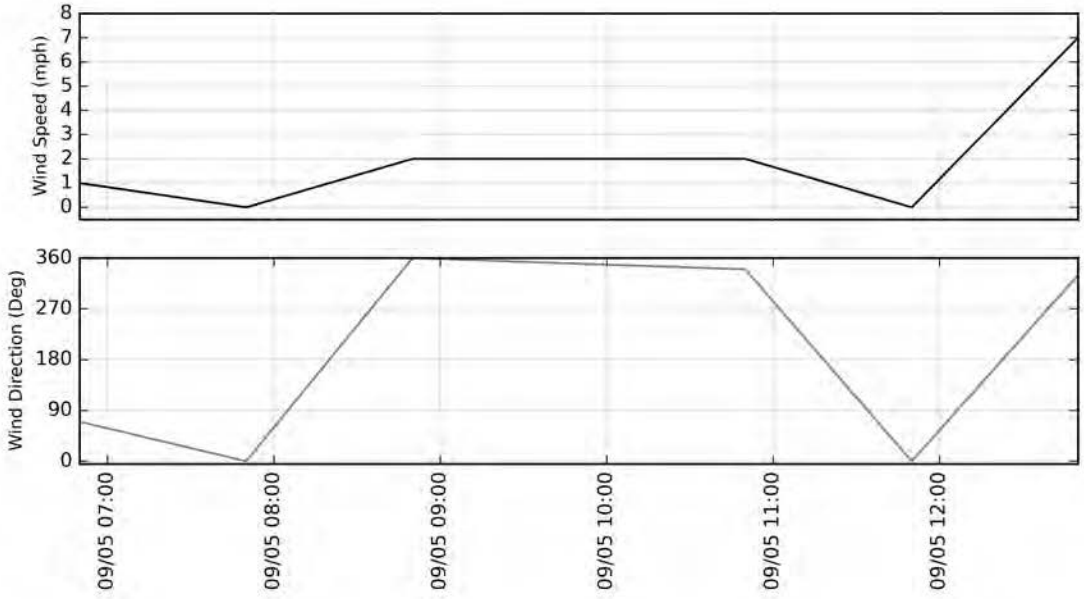
KHPY Windrose

(Highland Park Airport - 12.5 miles SSE of Site)


Weather Station: KHPY
Date: 2017-09-04
0.0 - 0.1 mph
0.1 - 4.0 mph
4.0 - 7.0 mph
7.0 - 11.0 mph
11.0 - 17.0 mph
17.0 - 21.0 mph
N
N-E
E
S-E
S
S-W
W
N-W
29 %
24 %
18 %
12 %
6 %


Wind Speed (mph)
0
2
4
6
8
10
Wind Direction (Deg)
0
90
180
270
360
09/04 08:00
09/04 10:00
09/04 12:00
09/04 14:00
09/04 16:00
09/04 18:00
09/04 20:00
09/04 22:00


Weather Station: KHPY
Date: 2017-09-05
0.0 - 0.1 mph
0.1 - 4.0 mph
4.0 - 7.0 mph
7.0 - 11.0 mph
11.0 - 17.0 mph
17.0 - 21.0 mph
N
N-E
E
S-E
S
S-W
W
N-W
33 %
27 %
20 %
13 %
7 %


Wind Speed (mph)
0
1
2
3
4
5
6
7
8
Wind Direction (Deg)
0
90
180
270
360
09/05 07:00
09/05 08:00
09/05 09:00
09/05 10:00
09/05 11:00
09/05 12:00